REMARKS/ARGUMENTS

Claims 1 and 3–12 are pending in this application. Claims 1 and 9 have been amended to indicate that the photothermographic material is sensitive to and imaged by infrared radiation as described on pages 10 (lines 17-19), 23 (lines 20-23), and 53 (lines 6-10) of the present application. The subject matter of cancelled Claim 3 has also been incorporated into amended Claim 1 and Claim 2 has likewise been cancelled. Moreover, Claim 1 has been amended in response to the Section 112(2) rejection as described below.

Rejection Under 35 U.S.C. §112(2)

Claims 1-12 have been rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter that Applicants regard as their invention. The Office Action alleges a lack of antecedent basis for and definition of b* in Claims 1, 6, and 7.

Applicants have amended Claim 1 to overcome this rejection and to provide a clarification and definition of b* in reference to the CIELAB color system as noted on page 14 (lines 3-19) of the present application. This color system is well known in the imaging arts and readily used by a skilled artisan to measure and evaluate image tone.

Rejections Under 35 U.S.C. §102

I. In paragraph 5 of the Office Action, Claims 1, 2, and 4-8 have been rejected as anticipated by U.S. Patent 6,284,442 (Van Ackere et al.).

II. In the same paragraph, Claims 1, 2, and 4-8 have been rejected as anticipated by U.S. Patent 6,147,657 (Weidner et al.).

III. In paragraph 8 of the Office Action, Claims 9-11 have been rejected as anticipated by U.S. Patent 5,705,324 (Murray).

IV. In paragraph 9 of the Office Action, Claims 1-3 and 5-8 have been rejected as anticipated by U.S. Patent 5,998,126 (Toya et al.).

V. In paragraph 10 of the Office Action, Claims 1 and 4 have been rejected an anticipated by U.S. Patent 5,891,615 (Winslow et al.).

In view of the claims presently in this application, each of these rejections is traversed for the following reasons.

Rejection I:

Van Ackere et al. does not anticipate the presently claimed invention of Claims 1, 2, and 4-8 because it fails to describe a photothermographic material that has an absorbance in the thermally developable imaging layers of at least 1.0 at the exposure wavelength as required in amended Claim 1. The imaging layer of the only photothermographic example (Example 14) does not include an acutance dye that would provide this required absorbance. The IMATION DRYVIEW® Laser Imaging Film referenced in Van Ackere et al. did not contain sufficient components such as acutance dyes in the imaging layer to provide the required absorbance of at least 1.0. This fact is substantiated by co-Applicant Bryan Hunt in the enclosed **Rule 132 Declaration**. Van Ackere et al. added COLORANT 11 on the "backside" or non-imaging side of the support (Col. 21, lines 22-29) in Example 14, but not in the thermally developable imaging layers as called for in the present invention. Also, this dye has a maximum absorption of 657 nm, far from the exposure wavelength for the photothermographic material of this invention. Thus, Claim 1 is not anticipated by Van Ackere et al.

Claim 2 has been cancelled and Claims 4-8 are dependent upon Claim 1 that is novel over Van Ackere et al. Therefore, the anticipation rejection of Claims 1,2, and 4-8 over Van Ackere et al. should be withdrawn.

Rejection II:

Weidner et al. also fails to anticipate the presently claimed invention of Claims 1, 2, and 4-8 because this reference fails to describe an IR-sensitive photothermographic material as required in amended Claim 1. The photothermographic materials demonstrated in the reference (e.g. in the examples) are all "red"-sensitive materials (see Col. 27, lines 39-40, Col. 28, lines 65-66, Col. 30, lines 32-33, Col. 31, lines 46-47, and Col. 33, lines 14-15). The imaging lasers emit below 700 nm so they are in the "red" region of the spectrum as defined by the present application (page 13, lines 23-24). Moreover, there is no teaching in the examples to indicate that dyes are incorporated into the

imaging layers to provide an absorbance of at least 1.0 at the exposure wavelength.

Claim 2 has been cancelled and Claims 4-8 are dependent upon Claim 1 that is novel over Weidner et al. Therefore, the anticipation rejection of Claims 1,2, and 4-8 over Weidner et al. should be withdrawn.

Rejection III:

Murray fails to anticipate the presently claimed invention because method Claims 9-11 require the use of the photothermographic material of amended Claim 1 that must have an absorbance in the thermally developable imaging layers of at least 1.0 at an exposure wavelength. Nothing in the preparation of the imaging layers in the examples of Murray describes the presence of components (e.g. acutance dyes) that would provide the required absorbance in the photothermographic material.

Thus, the anticipation rejection of Claim 9-11 over Murray should be withdrawn.

Rejection IV:

Toya fails to anticipate the presently claimed invention of Claims 1-3 and 5-8 because this reference fails to described IR-sensitive photothermographic materials as required in amended Claim 1. Rather, Toya clearly teaches that the photothermographic materials must be sensitive to exposure to laser light having a wavelength of less than 700 nm (Col. 2, lines 1-11) in order to avoid interference when a dyestuff is included in the material.

Claim 2 has been cancelled and Claims 3 and 5-8 are dependent upon novel Claim 1. Therefore, the anticipation rejection of Claim 1-3 and 5-8 over Toya should be withdrawn.

Rejection V:

Winslow et al. also fails to anticipate the presently claimed invention of Claims 1 and 4 because amended Claim 1 requires the photothermographic material to have an absorbance in the thermally developable imaging layers of at least 1.0. Nothing in the preparation of the imaging layers in the examples of Winslow et al. describes the presence of sufficient components

(e.g. acutance dyes) that would provide the required absorbance. This fact is also substantiated by co-Applicant Bryan Hunt in the enclosed **Rule 132 Declaration**. Antihalation dyes are described for use only on the backside (or non-imaging side) of the support.

Claim 4 is dependent upon novel Claim 1. Thus, the anticipation rejection of Claims 1 and 4 over Winslow et al. should be withdrawn.

Rejections Under 35 U.S.C. §103

VI. In paragraph 5 of the Office Action, Claims 1, 2, and 4-8 also have been rejected as being unpatentable over Van Ackere et al.

VII. In the same paragraph, Claims 1, 2, and 4-8 have been rejected as unpatentable over Weidner et al.

VIII. In paragraph 6 of the Office Action, Claims 9-12 have been rejected as unpatentable over the combination of Van Ackere et al. and Murray.

IX. In the same paragraph, Claims 9-12 also have been rejected as unpatentable over the combination of Wiedner et al. and Murray.

X. In paragraph 7 of the Office Action, Claim 3 has been rejected as unpatentable over the combination of Ackere et al. with U.S. Patent 6,146,823 (Katoh et al.).

XI. In the same paragraph 7, Claim 3 also has been rejected as unpatentable over the combination of Wiedner et al. with Katoh et al.

XII. In paragraph 9 of the Office Action, Claims 1-3 and 5-8 have been rejected as unpatentable over Toya.

XIII. Lastly, in paragraph 11 of the Office Action, Claim 12 has been rejected as unpatentable over Murray combined with U.S. Patent 5,172,419 (Manian et al.).

In view of the claims presently in this application, each of these rejections is respectfully traversed for the following reasons.

Rejection VI:

The Examiner has rejected Claims 1, 2, and 4-8 as obvious over Van Ackere et al. in view of its teaching about the use of multiple tinting dyes in the photothermographic material to provide a very negative b* value. This rejection is believed to be in error for the following reasons.

The present invention is directed to an IR-sensitive photothermographic material having an image tone that is characterized as having a b* value, upon imaging and processing, at an optical density of 1.0 that is greater than the b* value at D_{min}. In addition, the thermally developable imaging layer(s) of the photothermographic material have a total absorbance of at least 0.6 at an exposure wavelength. These photothermographic materials have the tone desired by the medical profession at the critical optical density between D_{min} and 1.0. Such characteristics provide images that are observably sharper or clearer. It is not sufficient to have "colder" or "bluer" toned images for this to be true. Rather the relationship of b* and optical density was discovered to be critical to these desirable results.

No teaching in Van Ackere et al. addresses this problem or suggests Applicants' solution to the problem. While Van Ackere et al. recognizes the need for "bluer" images for medical diagnostics (Col. 3, lines 13-35), the reference teaches that the problem can be solved by addition of at least two colorants with maximum absorptions at a wavelength between 450 and 700 nm, at least one of which is in the support. The Office Action points to Claims 7-11, the blue dye in Col. 23, and a b* value of –16.23 in Col. 18, but fails to provide any explanation as to the relationship of these isolated features or how, individually or collectively, they suggest Applicants' claimed invention. The blue dye shown in Col. 23 and the noted b* value are described for thermographic materials not photothermographic materials.

In addition, Applicants have demonstrated in their comparative examples that merely having the specified imaging material, with at least two colorants with maximum absorptions at a wavelength between 450 and 700 nm, does not lead to Applicants' claimed invention. The Examiner's attention is directed to Comparative Examples D-F and Invention Example 1 beginning on page 60 of the present application. Each photothermographic material contained a blue dye (blue dye shown on page 67 in the support of Comparative Examples D-F). Comparative Examples E and F also contained tinting dye TD-1 (page 66, lines 26-27 for "E" and page 67, lines 6-7 for "F"). Invention Example 1 also contained tinting dye TD-1 but a number of other changes (page 67, lines 9-15) were made to provide the total absorbance of the imaging layer of at least 0.6 and the required b* values. However, as noted in TABLES III and IV (pages 69-70),

the data indicates that the use of tinting dye TD-1 alone is not sufficient to provide desired image tone.

The Applicants' conclusions from the data, explained in detail on pages 68-71, are repeated here for the Examiner's convenience:

- The negative a* and b* values indicate that all of the films had a tone on the blue and green side of neutral.
- The tone measured at an optical density of 1.0 for all four films falls within the preferred tone described in U.S. Patent 6,174,657 (Weidner et al.), defined as a psychometric hue angle $h_{(ab)}$ of between 220° and 260°, where $h_{(ab)} = \arctan(b^*/a^*)$.
- The tint of the D_{min} patches (OD = 0.2) was slightly bluer and greener for Comparative Examples E and F and Inventive Example 1, than for Comparative Example D. This was probably due to the difference in color of the acutance dye and tinting dye used in these samples.
- In Comparative Examples E and F and Inventive Example 1, even though the tint of the D_{min} patches were nearly the same, the b* values of the optical density between 0.5 and 2.5 (OD) of the patches indicate that the tone of the samples is different.
- As optical density increased, Comparative Example D, E, and F films became more blue (that is, b* became more negative). At an optical density of 1.0, the image was bluer than at D_{min}. In Inventive Example 1, as optical density increased, the image became more neutral more quickly (b* approached zero more quickly), so that at an optical density of 1.0, the image was more neutral (less blue) than at D_{min} by 0.7 b* units. Thus, although the tint was equivalent for Comparative Example E and F films and Inventive Example 1 the image tone was not. (emphasis added)
- The results for Comparative Examples D, E, and F show that Δb^*, defined as b* at an Optical Density of 1.0 minus b* at D_{min}, is negative. This indicates that the image of the Comparative Examples D-F at an Optical Density of 1.0 is more blue than at D_{min}. (emphasis added)

- The results for Inventive Example 1 shows that Δb*, defined as b* at an Optical Density of 1.0 minus b* at Dmin, is positive. This indicates that the image of the Comparative Examples at an Optical Density of 1.0 is less blue than at Dmin.

The Applicants then concluded that the use of a tinting dye in the topcoat layer and a different acutance dye caused the tint of Comparative Examples E and F and Inventive Example 1 to be different than that of Comparative Example D. However, tinting dyes do not affect image tone independently of tint. For Comparative Examples E and F and Inventive Example 1, which all had the same tinting dye, the image tone was changed by varying the levels of 4-methyl-phthalic acid, 2-(tribromomethylsulfonyl)pyridine, and the use of a chemical sensitizer. These additives affected the development of the image and image tone independently of tint.

Van Ackere et al. teaches that the diagnostic benefit of their photothermographic materials is enhanced by the addition of blue tinting dyes to the support and various layers. They allegedly demonstrate this result in Example 14 by taking a sample of commercial photothermographic film (then IMATION's DryView® Laser Imaging Film), coating a colorant in gelatin on the backside and obtaining an image with a "bluer" tone having a b* value of –8.9 instead of a b* value of –7.03 without the colorant at an optical density of 1.0. This supposedly shows an improved diagnostic value for the modified photothermographic material.

However, tinting dyes are known to affect image tone at D_{min} far more than at higher optical densities. Merely stating that diagnostic value is enhanced because the image is "bluer" at optical density 1.0, as suggested by Van Ackere et al. is not sufficient to satisfy the industry. The addition of those tinting dyes will likely be a detriment at D_{min}. Applicants found to the contrary of Van Ackere et al., that a material is more desirable for medical diagnostics even if its tone is less blue (i.e. more positive b*) at optical density 1.0 as long as the b* at 1.0 is greater than the b* at D_{min}. Thus, the difference in b* values at these two optical densities in the image is more important than the b* value solely at 1.0. This fact is not recognized in Van Ackere et al., and thus it cannot suggest Applicants' claimed invention. Applicants' invention provides desired medical

images contrary to what Van Ackere et al. would lead a skilled artisan to believe or do.

This unexpected result is further illustrated in Applicants comparative examples.

For Comparative Example E and Invention Example 1, the b* values at optical density of 1.0 are –8.7 and –7.5, respectively. If one followed the teaching in Van Ackere et al, Comparative Example E would have the preferred image tone and better diagnostic capability since its b* value is more negative ("bluer") at optical density 1.0. However, this was not the case. The images from these two materials were evaluated by groups of radiologists for diagnostic preference, color (tint and tone), and overall preference (page 71, lines 17ff). As Applicants stated in their application, summarizing the findings of TABLE V:

> "Invention Example 1 was preferred in all three categories. The most common reason given for preferring Invention Example 1 was that it provided a clearer or sharper image, indicating better diagnostic quality. This shows that appearance and diagnostic usefulness can be strongly influenced by image tint and tone, and that Inventive Example 1 provided the desired improvement."

In fact, according to the teaching in Van Ackere et al. all of Applicants' Comparative Examples A, C, D, E, and F would be preferable for diagnostic capability over their invention examples. But this is contrary to Applicants' findings.

Thus, merely incorporating blue tinting dyes as taught in Van Ackere et al. fails to provide images with the desired image tone obtained by the photothermographic materials of Applicants' Claim 1, and therefore, Van Ackere et al. cannot teach or suggest these claimed materials.

Rejection VII:

Claims 1, 2, and 4-8 have also been rejected as unpatentable over Weidner et al. The Office Action alleges that Weidner et al teaches the same photothermographic material, pointing to Cols. 33-48, Claims 1-16, and the use of

tinting dyes in Col. 2 (lines 21-60) but fails to provide any explanation as to the relationship of these isolated features or how, individually or collectively, they suggest Applicants' claimed invention. Applicants believe that this reference fails to teach or suggest the presently claimed invention for the following reasons.

Weidner et al. describes a specific psychometric hue angle providing a color space that defines image tone that radiologists are considered to prefer. This is usually achieved by the addition of tinting dyes to the photo-thermographic materials. In addition, Weidner et al. describes imaging at a wavelength below 700 nm so the materials are not IR-sensitive.

Applicants respectfully submit that merely having materials with image tone within the color space defined by Weidner et al. or the addition of tinting dyes fails to teach or suggest Applicants' claimed invention. All of Applicants' Comparative Examples shown in the application fall within the hue angle color space of Weidner et al. and contain tinting dyes in the support. Yet, as pointed out above, the Comparative Examples failed to provide desirable image tone. More specifically, Comparative Examples E and F contained an additional tinting dye, TD-1 but this also failed to provide the desired image tone.

The same reasoning applied to Van Ackere et al. applies here but it is not repeated for the sake of brevity. Suffice it to state again that the images from Comparative Examples E and F and Invention Example 1 were evaluated by groups of radiologists for diagnostic preference, color (tint and tone), and overall preference (page 71, lines 17ff). As Applicants stated in their application, summarizing the findings of TABLE V:

> "Invention Example 1 was preferred in all three categories. The most common reason given for preferring Invention Example 1 was that it provided a clearer or sharper image, indicating better diagnostic quality. This shows that appearance and diagnostic usefulness can be strongly influenced by image tint and tone, and that Inventive Example 1 provided the desired improvement."

In fact, according to the teaching in Weidner et al. all of Applicants' Comparative Examples A, C, D, E, and F would be equally useful as the present invention since they provide images haveing the defined image tone of

that reference for diagnostic capability. But this is contrary to Applicants' findings. In addition, in Weidner et al., the materials are imaged in the red region of the spectrum so they are not IR-sensitive as required by the present invention.

Thus, merely incorporating blue tinting dyes as taught in Weidner et al. to obtain the desired color space for the image tone fails to provide the desired image tone obtained by the photothermographic materials of Applicants' Claim 1, and therefore, Wiedner et al. cannot teach or suggest these claimed materials.

Rejection VIII:

Claims 9-12 have been rejected an unpatentable over the combined teaching of Van Ackere et al. with Murray. The Office Action alleges that because Van Ackere et al. teaches the use of tinting dyes in photothermographic materials, and Murray teaches photothermographic imaging methods, the method claims of the present application are obvious. This rejection is in error because, first of all, Murray fails to provide any teaching to overcome the deficiencies of Van Ackere et al. that are pointed out above (those arguments are not repeated here for the sake of brevity). Nothing in Murray teaches or suggests the desirability of modifying image tone as required by the present invention so that the b* value at optical density of 1.0 is greater than the b* value at D_{min} and nothing in Murray teaches or suggest the requirement of a total absorbance of at least 0.6 in the imaging layers.

Moreover, Applicants method claims 9-12 are patentable over Van Ackere et al. with Murray because those claims require the use of the photothermographic material of Claim 1 that is patentable over Van Ackere et al. alone or with Murray as pointed out above. Thus, this rejection should be withdrawn.

Rejection IX:

Claims 9-12 also have been rejected an unpatentable over the combined teaching of Weidner et al. with Murray. The Office Action alleges that because Weidner et al. teaches the use of tinting dyes in photothermographic materials, and Murray teaches photothermographic imaging methods, the method claims of the present application are obvious. This rejection is in error because, first of all, Murray fails to provide any teaching to overcome the deficiencies of

Weidner et al. that are pointed out above (those arguments are not repeated here for the sake of brevity). Nothing in Murray teaches or suggests the desirability of modifying image tone as required by the present invention so that the b* value at optical density of 1.0 is greater than the b* value at D_{min} and nothing in Murray teaches or suggest the requirement of a total absorbance of at least 0.6 in the imaging layers.

Moreover, Applicants method claims 9-12 are patentable over Weidner et al. with Murray because those claims require the use of the photothermographic material of Claim 1 that is patentable over Weidner et al. alone or with Murray as pointed out above. Thus, this rejection should be withdrawn.

Rejection X:

Claim 3 has been rejected as unpatentable over the combined teaching of Van Ackere et al. with Katoh. The Office Action argues that because Katoh teaches the use of a dyestuff (Col. 16) to provide an absorbance at least 0.8 at an exposure wavelength, it would be obvious to combine the absorbance with the teaching of Van Ackere et al. Applicants respectfully disagree.

Katoh teaches the use of a dyestuff to provide the higher absorbance only in an antihalation layer on the frontside or backside of the photothermographic material. It does not teach a higher absorbance in the imaging layers (Col. 15, line 66 to Col. 16, line 14). This teaching is no different than adding a tinting dye as taught in Van Ackere et al. that is discussed above. As noted in Applicants' detailed arguments above, merely adding a tinting dye does not provide the image tone desired by radiologists. Rather, Applicants's claimed invention requires that the b* value at 1.0 optical density be greater than the b* value at D_{min} and that the imaging layers have an absorbance of at least 0.6 (or at least 1.0 for Claim 3). Neither Van Ackere et al. nor Katoh teaches this combination of features of the presently claimed invention. Therefore, the rejection of Claim 3 should be withdrawn as lacking merit and because Claim 3 is dependent upon patentable Claim 1.

Rejection XI:

Claim 3 also has been rejected as unpatentable over the combined teaching of Weidner et al. with Katoh. The Office Action argues that because Katoh teaches the use of a dyestuff (Col. 16) to provide an absorbance at least 0.8 at an exposure wavelength, it would be obvious to combine the absorbance with the teaching of Weidner et al. Applicants respectfully disagree.

Katoh teaches the use of a dyestuff to provide the higher absorbance only in an antihalation layer on the frontside or backside of the photothermographic material. It does not teach a higher absorbance in the imaging layers (Col. 15, line 66 to Col. 16, line 14). This teaching is no different than adding a tinting dye as taught in Weidner et al. that is discussed above. As noted in Applicants' detailed arguments above, merely adding a tinting dye does not provide the image tone desired by radiologists. Rather, Applicants's claimed invention requires that the b* value at 1.0 optical density be greater than the b* value at D_{min} and that the imaging layers have an absorbance of at least 0.6 (or at least 1.0 for Claim 3). Neither Weidner et al. nor Katoh teaches this combination of features of the presently claimed invention. Therefore, the rejection of Claim 3 should be withdrawn as lacking merit and because Claim 3 is dependent upon patentable Claim 1.

Rejection XII:

Claims 1-3 and 5-8 have been further rejected as unpatentable over the teaching in Toya. The Office Action alleges that Toya teaches the same photothermographic material and composition having an absorbance of 0.3-1.2 at the exposure wavelength. Applicants respectfully disagree.

Applicants admit that Toya teaches the higher absorbance for the photosensitive layer. However, what Toya lacks is a teaching that this higher absorbance should be combined with an image tone that is defined by the b* value greater at 1.0 optical density than at D_{min}. Toya is directed to the problem of interference fringe resulting from reflected imaging radiation when imaging is carried out in the red region of the spectrum (below 700 nm). Thus, the Toya materials are not IR-sensitive. Toya is not directed to the same problem solved by Applicants' invention, i.e. providing improved image tone for radiologists. Thus, there is nothing in Toya that would teach or suggest Applicants' claimed invention with different features for solving a different problem. This rejection is

a classic case of picking out some selected claim features from the reference without consideration of whether those features would be combined with other unnamed features to solve a different problem. Only with hindsight could one speculate that a skilled worker would be led to Applicants' claimed invention from Toya. Thus, the rejection should be withdrawn.

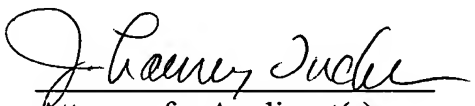
Rejection XIII:

Finally, Claim 12 has been rejected as unpatentable over the combined teaching of Murray and Manian. The Office Action argues that the method of digitizing a medical film image is known from Manian and that it would have been obvious to use this technique with the process taught in Murray.

Applicants are not relying upon the subject matter of dependent Claim 12 for patentability. This claim is dependent upon method Claim 9 that uses the patentable material of Claim 1. By virtue of the patentability of Claim 1, the dependent claims are likewise patentable and the rejection of Claim 12 should be withdrawn.

In view of the foregoing amendments and remarks, reconsideration of this patent application is respectfully requested. A prompt and favorable action by the examiner is earnestly solicited.

Respectfully submitted,



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